Passive dosing of pyrethroid insecticides to Daphnia magna: Expressing excess toxicity by chemical activity

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TU137 Passive dosing of pyrethroid insecticides to Daphnia magna: Expressing excess toxicity by chemical activity S.N. Schmidt, Technical University of Denmark / Department of Environmental Engineering; J. Gan, University of California Riverside / Department of Environmental Science; A.C. Kretschmann, University of Copenhagen; N. Cedergreen, University of Copenhagen / Department of Plant and Environmental Sciences; P. Mayer, Technical University of Denmark / Department of Environmental Engineering. Pyrethroid insecticides are nerve poisons and used as active ingredients in pesticide mixtures available for household and agriculture. The compounds are hydrophobic, and their strong sorption to organic material may result in decreasing exposure levels during toxicity tests and consequent underestimation of pyrethroid toxicity. This poster addresses three questions regarding the acute toxicity of pyrethroids towards the aquatic invertebrate *Daphnia magna*: (1) Is pyrethroid toxicity generally underestimated in the literature due to insufficiently controlled exposure levels? (2) At which chemical activity do pyrethroids exert their toxicity, and how similar are the effective chemical activities (Ea50) for different pyrethroids? (3) How much more toxic are pyrethroids relative to baseline toxicity? Toxicity experiments were conducted using passive dosing: Polydimethyl siloxane (PDMS) silicone was loaded with ?-cypermethrin, esfenvalerate and bifenthrin, respectively, and then applied to control the exposure to *D. magna* for 48 h by equilibrium partitioning. In this way, the exposure was kept constant since various losses were efficiently buffered by re-partitioning from the polymer. Based on results from the conducted passive dosing experiments and literature data, the three questions will be addressed in the following manner: (1) The effective concentration resulting in 50% immobilisation (EC50) will be determined for each of the three pyrethroids and compared to literature values, (2) Effective chemical activities resulting in 50% immobilisation (Ea50) will be estimated from pyrethroid EC50 values via the correlation of sub-cooled liquid solubility (S_L, [mmol/L], representing a=1) and octanol to water partitioning ratios (K_{ow}), (3) The excess toxicity observed for pyrethroids will be evaluated by comparing Ea50 values for individual pyrethroids to the chemical activity needed to initiate baseline toxicity (a=0.01-0.1).